REMARKS

The applicant notes that the previous attorney, Jim Fritz passed away unexpectedly around December 2003, and the present agent, Jay Chesavage, is now assuming prosecution of this case. Removal of attorney Fritz is requested under MPEP 406.

Applicant also notes that during a telephonic status check after the execution of the power of attorney with the Customer Service department of the PTO, Agent Chesavage was informed that there were no pending office actions in the present case. Upon transfer of the files from Mr. Fritz office to ours, we were surprised to discover an office action dated September 20, 2003, for which the last date for response was March 20, 2004. No notice of abandonment has been received, and applicant requests that the following contact information be verified for the attorney or record in the case:

Jay Chesavage Reg. No 39,137
3833 Middlefield Rd
Palo Alto, Ca. 94303

In accordance with the revival procedure for an unintentionally abandoned application under 37 CFR 1.137(b), the present amendment is accompanied by:

1) Petition for 3 month extension of time (including 37 CFR 1.17(a) fee of $475)

2) Petition to revive unintentionally abandoned application (including 37 CFR 1.17(m) fee of $665).

Applicant has cancelled the original claims except for claims 11 and 16, and has added new claims 20-46. All of the new and amended claims are drawn to the class of collectors which are suitable for use with electron beams which are operating under the influence of a confining high level magnetic field. The prior art collectors all share these characteristics:

1) The electron beam collectors of the prior art operate in a region outside of the magnetic field used to confine the electron beam. The electron beam is confined in the beam tunnel of the device to maximize the interaction between the beam tunnel structures and the electron beam. Once the electron beam leaves the beam tunnel, the concentrating force of the magnetic field is removed, and the space charge forces cause the electrons to repel away from each other, causing the beam to diverge. For weak magnetic fields and moderate

to high density electron beams, the trajectory of an electron in the center of the beam surrounded by other electrons tends to be straight, since the surrounding electrons provide balanced relative charge, while the trajectory of the electrons outside of the center of the beam tends to be in the trajectory of an arc of increasing radius of curvature, as the repulsive forces of all the other electrons in the beam cause a greater divergence, and as the beam diverges, these space charge repulsive forces decrease. This diverging electron beam behavior in the collector from the absence of a confining magnetic field is clear from the prior art figures and specifications:

Adler 6,060,832 - Figures 1 & 2 show the magnetic field "beam-focusing structure which surrounds the slow wave structure" (col 1 line 18-20), and the collector 32 outside the extent of the field generator. The divergence of the electron beam is clearly seen in the electron trajectories figures 4 (features 116, 114, 118), 5, 6A, 6B, 6C, 7A, 8A, 8B, and 9A. In every case as illustrated and described in Adler, the electron space charges result in divergent spreading of the beam, and a series of depressed collectors such as 60, 62, 64 of figure 3, interact with the traveling

electrons to remove energy from electrons by deflecting them further and reducing their velocity.

Similar geometries with the collector outside the extent of the electron-beam confining magnetic field are present in the cited prior art of Symons 6,380,803 (figure 4 trajectory 82, 83, 84, 85, 86, and col 8 line 7-10). Cardwell 6,111,358 states that the magnetic field generated by structure 26 of figure 1 is confined to the region of the beam tunnel and not the collector in col 4 line 44-57. Shult 6,429,589 only operates the beam-confining magnetic field within the beam tunnel, and the electrodes 44, 46, and 48 of figure 1 provide electrostatic attraction to reduce the velocities of the incoming electrons from the beam, which is typical of a low-energy electron beam.

In devices where the physical extent of the electron beam is very short, or the electron beam velocity is very high, it is not possible to place the collector outside the magnetic field. When the beam remains confined by the magnetic field in the region of the collector, it does not diverge as shown in Adler. For the case of sub-millimeter wave devices, such as the present invention, the beam tunnel and collector share the same magnetic field without reduction in field strength. In devices of the present invention,

the drift tube and gap region of the device are less than 100 microns, and the device requires high velocity electrons, which introduces the requirement for a large magnitude confining magnetic field. The result of using an electron beam controlled by a high magnetic field coupled with the collector operating within rather than outside the magnetic field is that the space charge does not cause the beam to diverge in the collector region. This stands in clear contrast to Adler.

With regard to the prior art other than Adler, the presence of a planar angled impinging surface for primary electrons to strike and generate backscattered primary electrons which are directed away from the beam tunnel provides distinction from these references. Applicant's claims 11 and 16, as well as the new claims 20-39 have been amended to require an impinging surface in the structural and functional operation of the device.

With regard to Adler, this collector (as do all of the other prior art references) operates outside of the confining magnetic field of the beam tunnel. With this magnetic field removed, electrostatic potentials are able to control the divergence of electrons, as seen in the arcuate trajectory tracings in all of the figures

of Adler. The influence of the confining magnetic field is so large compared to the electrostatic field control available, that electrostatic control of the electron beam in the presence of the confining magnetic field is insufficient. This is why Adler and other prior art terminate the magnetic field prior to the depressed field collector, thereafter using electrostatic fields to sort electrons by velocity.

With regard to Adler, applicant's claims have been amended to include these functional distinctions which set the present invention apart from the prior art. Applicant also wishes to clarify certain terminology and operational distinctions between Adler and the present invention using table 1.

Table 1:

Term	in Adler	in Applicant
Primary Electrons	Electrons traveling down beam tunnel. Upon entering collector from drift tube, magnetic field is greatly reduced, and primary electrons diverge due to space charges and the absence of a confining	Electrons traveling down beam tunnel. Upon entering collector, magnetic field is substantially the same as when in drift tube, and primary electrons in beam do not diverge.

	magnetic field.	
Reflected Primary Electrons (reflected primary electrons based on non-contact electrostatic repulsion from a reflector. Reflected primary electrons do not generate secondary electrons)	Primary Electrons without the confining influence of a magnetic field naturally diverge and sort out by velocity, leaving few high energy primary electrons in the collector to impact the surface 118 normal to the beam. The primary electrons remaining in the center of the beam are easily controlled and slowed by externally applied potentials. Electrons are diverted away from center of beam tunnel by space charge forces (116, 118 of figure 4 & 5) and depression voltages in collector. Remaining primary electrons which strike perpendicular surface 118	the collector voltage is set to avoid reflecting primary electrons based on the slowest primary electrons. Otherwise, reflected primary electrons will be directed back down the beam tunnel to the electron gun. The angled surface of the reflector results in most of the reflected primary electrons being directed into the dissipation cavity.

	generate few secondary electrons. In the presence of a confining magnetic field in the region of the collector, electron velocity sorting by electrostatic fields is not available, and the depression voltage must be set to slow the slowest velocity electrons, otherwise primary electrons would become reflected primary electrons traveling backwards to the electron gun down the beam tunnel. With a confined primary electron beam and a perpendicular surface, the remaining high energy electrons would strike the collector 118 which is perpendicular	

	to the beam at a high velocity, generating large numbers of backscattered primary electrons in addition to secondary electrons, most of which would be directed by the confining magnetic field backwards down the beam tunnel, causing the device to operate inefficiently.	
Backscattered Primary Electrons (reflected primary electrons which reflect based on an elastic collision with a reflector). High energy primary electrons tunnel deeper into the impacting surface, and yield fewer backscattered primary electrons than	Without a confining magnetic field in the collector, primary electrons spread such that few strike reflector 114 with high enough velocity to become backscattered primary electrons. If the collector were to operate in	In the presence of the confining magnetic field, angled impinging surface 110 causes backscattered primary electrons to reflect at a trajectory away from the primary electrons of the beam tunnel and into a dissipation cavity, where they have

lower energy primary electrons. Backscattered primary electrons generally have the same velocity as the incoming primary electrons.	the presence of a confining magnetic field and depression voltage required to slow the lowest velocity primary electrons, the primary electrons of high velocity would become backscattered primary electrons with the same velocity as the incoming primary electrons. Low energy backscattered electrons will be trapped by the magnetic field, but high energy backscattered electrons will be directed into the beam tunnel. For this reason, and without some form of angular reflection surface, the collector of Adler will return high energy backscattered primary electrons to the beam	minimum coupling to the electrons of the beam tunnel. Generated secondary electrons are also directed to the dissipation cavity, and not into the beam tunnel.

	tunnel, and not function when the collector is in the presence of a confining magnetic field.	
True secondary electrons (electrons released from reflector after inelastic collision by primary electrons)	Low voltage electrons released from reflector after being struck by a primary electron. In the absence of a confining magnetic field in the collector, the primary electron beam is sorted by electron velocity. In the presence of a confining magnetic field, spatial sorting by electron energy is not available as in Adler, and the depression voltage V2 of figure 4 is applied to the entire primary electron beam, thereby generating backscattered electrons and true secondary	Low voltage electrons released from the angled impinging surface 110 tend to reflect away from the beam tunnel, and the quantity of secondary electrons released is a function of angle between the impinging surface and primary electrons in the beam. Generated secondary electrons are directed to the dissipation cavity, and away from the beam tunnel.

	electrons. High energy backscattered electrons will not be trapped by Adler's electrostatic fields and instead travel back toward the circuit.	

In view of the above distinctions between the prior art of Adler and the present invention, any of the below limitations found in the amended claims of the present application invoke operation which is distinct functionally and structurally from the prior art of Adler:

1) The collector accepts a non-diverging electron beam striking an impinging surface. This limitation reflects the continuing presence of the same magnetic field which provides for a confined electron beam in the beam tunnel also operating in the collector region.

2) After striking the angled impinging surface, the trajectory of primary reflected electrons, primary backscattered electrons, and true secondary electrons are directed away from the beam tunnel. Adler does not need or use such a surface because of the use of electrostatic beam sorting, which minimizes the number

of high energy electrons striking the perpendicular surface. Adler makes reference to an electrostaticly angled surface 242, which operates only for reflected primary electrons, and has no effect whatever on backscattered primary electrons and the secondary electrons generated by a primary electron beam collision with a perpendicular impinging surface. In the present application, it is an angled impingement surface which creates backscattered primary electrons and secondary electrons from primary electrons, and the impingement surface is at an angle to the primary beam which is chosen to ensure the backscattered electrons will be contained by the reflector structure, as the backscattered primary electrons have high velocity and concentrated within the beam tunnel magnetic field, and are thus not electro-statically controllable.

3) The RF circuit and the collector operate in substantially the same axial magnetic field.

4) The impinging surface is planar and angled with respect to the beam axis, directing backscattered electrons away from the beam tunnel.

With regard to the 35 USC 102(b) rejection of claims 1, 6-11, 13-16 over Adler 6,060,832, applicant

notes that other than claims 11 and 16, these claims have been cancelled. Amended claims 11 and 16 now recite a non-diverging electron beam, which is distinct from Adler showing a diverging electron beam, and the claims also contain the limitation of a surface which has an angle sufficient to direct backscattered electrons away from the beam tunnel, which structure is also not found in Adler. New claims 20-39 share this limitation.

With regard to the 35 USC 102(b) rejection of claims 2-5, 12, and 17 over Schult 6,429,589, applicant notes that the rejected claims have been cancelled. For the examiners reference, the new claims 20-39 recite an angled and substantially planar impingement surface. The presence of electrostatic energy sorting electrodes 44, 46, 48, 52 in Schult clearly indicate that the electron beam is outside of the confining field used in RF shell 36 which includes the beam tunnel. Schult also has an electrostatic reflector 52 which is circularly symmetric, as opposed to the planar reflection surface of the new claims.

With regard to the 35 USC 102(b) rejection of claims 2-5, 12, and 17 over Cardwell 6,111,358,

applicant notes that the claims are now cancelled. New claims 20-39 now recite a non-diverging beam and an angled impingement surface, which is distinct from the electron energy using multiple electrodes (32, 34, 35, 38 of figure 1) and electrostatic electron sorting of Cardwell.

With regard to the 35 USC 103 rejection of claims 18-19 over Schult or Cardwell, applicant has cancelled these claims. With regard to consideration of the new claims, applicant notes the new claims recite the following structures not found individually in either of these references:

1) the electron beam incident on a planar impingement surface at an angle to the beam axis

2) a non-diverging electron beam entering the collector.

Applicant notes that new claims 30-38 are drawn to the collector for hollow or annular electron beams as shown in figure 2 of the present application.

Examiner is advised that agent Chesavage may be reached by telephone at 650-619-5270, or via e-mail at patents@chesavage.com

Respectfully Submitted,

Jay Chesavage

Registration No. 39,137